

CLAIMS

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

- 1 1. A method of measuring a stability of a plating bath, said method comprising:
 - 2 providing a plating bath having a known voiding threshold concentration;
 - 3 obtaining a bath liquor, possibly containing a void-formation marker (VFM) from
 - 4 said bath;
 - 5 determining a concentration of said void-formation marker; and
 - 6 maintaining said VFM concentration below said threshold concentration.
- 1 2. The method of measuring a stability of a plating bath, according to claim 1, wherein
- 2 determining a concentration of said void-formation marker comprises:
 - 3 separating said void-formation marker from said plating bath liquor; and
 - 4 quantifying said void-formation marker.
- 1 3. The method of measuring a stability of a plating bath, according to claim 2, wherein said
- 2 void-formation-marker is separated chromatographically.
- 1 4. The method of measuring a stability of a plating bath, according to claim 3, wherein said
- 2 void-formation-marker is separated by liquid chromatography.
- 1 5. The method of measuring a stability of a plating bath, according to claim 3, wherein said
- 2 void-formation-marker is separated by high performance liquid chromatography (HPLC).
- 1 6. The method of measuring a stability of a plating bath, according to claim 3, wherein said
- 2 chromatography comprises ion-pairing, reversed-phase chromatography.

1 7. The method of measuring a stability of a plating bath, according to claim 2, wherein said
2 quantifying is performed by instrumental analytical methods selected from the group consisting
3 of spectroscopy and electrochemical detection.

1 8. The method of measuring a stability of a plating bath, according to claim 7, wherein said
2 spectroscopy comprises techniques selected from the group consisting of ultraviolet, visible,
3 infrared, and mass spectroscopy.

1 9. The method of measuring a stability of a plating bath, according to claim 2, wherein said
2 quantitation is provided by instrumentation that provides a quantitative output in proportion to a
3 concentration of said void-formation marker.

1 10. A method of measuring a plating bath breakdown threshold value, T, said method
2 comprising:
3 plating at least one metal on a substrate;
4 determining a plurality of time-points;
5 determining a VFM ratio for each of said time-points;
6 counting, for each of said time-points, a number of voids in the metal plated on said
7 substrate;
8 determining said threshold value as the largest VFM ratio at which no voids are
9 observed.

1 11. A method of measuring a plating bath breakdown threshold value, according to claim 10,
2 wherein said VFM ratio is the said concentration of said void-formation marker divided by a
3 concentration of an accelerator.

1 12. A method of maintaining a plating bath under non-voiding conditions, the method
2 comprising the steps of:

- 3 determining a bath threshold value, T;
 - 4 determining a C_{VFM} ; and
 - 5 performing a bleed and feed to maintain said C_{VFM} below the value of said threshold.
-
- 1 13. A method of maintaining a plating bath under non-voiding conditions, according to claim
 - 2 12, wherein said bleed and feed comprises the steps of:
 - 3 adding a volume of fresh bath liquor to bring the volume to a fractional volume above a
 - 4 nominal bath volume; and
 - 5 removing said fractional volume;
-
- 1 14. A method of maintaining a plating bath under non-voiding conditions, according to claim
 - 2 13, wherein said fractional volume is from about 1% to about 10%.